SEQUENCE LISTING

<110> KUSTERS, Johannes G.
      CATTOLI, Giovanni

<120> HELICOBACTER FELIS VACCINES

<130> KUSTERS

<140> 09/904,994
<141> 2001-07-13

<150> EP00202565.8
<151> 2000-07-17

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<170> PatentIn Ver. 2.1

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taaaatttaa cacaaggagt aatag gtg aaa ctc aca ccc aaa gag caa gaa 232
                               Val Lys Leu Thr Pro Lys Glu Gln Glu
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aag ttc ttg tta tat tat gcg ggc gaa gtg gct aga aag cgc aaa gca 280
Lys Phe Leu Leu Tyr Tyr Ala Gly Glu Val Ala Arg Lys Arg Lys Ala
    10   15   20   25

gag ggc tta aag ctc aac caa ccc gaa gcc att gct tac att agt gcc 328
Glu Gly Leu Lys Leu Asn Gln Pro Glu Ala Ile Ala Tyr Ile Ser Ala

Glu Gly Leu Lys Leu Asn Gln Pro Glu Ala Ile Ala Tyr Ile Ser Ala
          30   35   40

cat att atg gac gaa gcg cgc cgt gga aaa aaa acc gtt gcc cag ctt   376
His Ile Met Asp Glu Ala Arg Arg Gly Lys Lys Thr Val Ala Gln Leu
              45   50   55

atg gaa gag tgc atg cac ttt ttg aaa aaa gat gaa gta atg ccc ggg   424
Met Glu Glu Cys Met His Phe Leu Lys Lys Asp Glu Val Met Pro Gly
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gtg ggt aat atg gtt ccc gat cta ggt gta gaa gcc acc ttt cct gat   472
Val Gly Asn Met Val Pro Asp Leu Gly Val Glu Ala Thr Phe Pro Asp
      75   80   85

ggt acg aaa ctt gta act gtg aat tgg ccc atc gaa cca gat gag cac   520
Gly Thr Lys Leu Val Thr Val Asn Trp Pro Ile Glu Pro Asp Glu His
      90   95   100   105

ttc aaa gcg ggc gaa gtg aaa ttt ggt tgc gat aaa gac atc gag ctc   568
Phe Lys Ala Gly Glu Val Lys Phe Gly Cys Asp Lys Asp Ile Glu Leu
              110   115   120

aat gca ggc aaa gaa gta acc gaa ctt gag gtt act aat gaa ggg cct   616
Asn Ala Gly Lys Glu Val Thr Glu Leu Glu Val Thr Asn Glu Gly Pro
              125   130   135

aaa tcc ttg cat gtg ggt agc cat ttc cac ttc ttt gaa gct aac aag   664
Lys Ser Leu His Val Gly Ser His Phe His Phe Phe Glu Ala Asn Lys
              140   145   150

gca cta aaa ttc gat cgt gaa aaa gcc tat ggc aaa cgc cta gat att   712
Ala Leu Lys Phe Asp Arg Glu Lys Ala Tyr Gly Lys Arg Leu Asp Ile
      155   160   165

ccc tct ggc aac acg cta cgc att ggg gca gga caa acc cgc aaa gtg   760
Pro Ser Gly Asn Thr Leu Arg Ile Gly Ala Gly Gln Thr Arg Lys Val
170   175   180   185

cag ttg att cct ctt ggt ggc agt aaa aaa gtg att ggc atg aac ggg   808
Gln Leu Ile Pro Leu Gly Gly Ser Lys Lys Val Ile Gly Met Asn Gly
              190   195   200

ctt gtg aat aac atc gcg gat gaa cgc cat aaa cat aaa gcg ctt gac   856
Leu Val Asn Asn Ile Ala Asp Glu Arg His Lys His Lys Ala Leu Asp
              205   210   215

aag gcg aaa tct cac gga ttt atc aag taa ggagactccc atg aaa atg   905

2

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Lys Ala Lys Ser His Gly Phe Ile Lys              Met Lys Met
    220                     225                           230


aaa aaa caa gaa tat gta aat acc tac gga ccc acc aaa ggc gat aaa   953
Lys Lys Gln Glu Tyr Val Asn Thr Tyr Gly Pro Thr Lys Gly Asp Lys
                    235                 240                 245


gtg cgc tta gga gat acc gat ctt tgg gca gaa gta gaa cat gac tat   1001
Val Arg Leu Gly Asp Thr Asp Leu Trp Ala Glu Val Glu His Asp Tyr
                250                 255                 260


acc acc tat ggc gaa gaa ctt aaa ttt ggc gcg ggt aaa act atc cgt   1049
Thr Thr Tyr Gly Glu Glu Leu Lys Phe Gly Ala Gly Lys Thr Ile Arg
                265                 270                 275


gag ggt atg ggt cag agc aat agc cct gat gaa aac acc cta gat tta   1097
Glu Gly Met Gly Gln Ser Asn Ser Pro Asp Glu Asn Thr Leu Asp Leu
                280                 285                 290


gtc atc act aac gcg atg att atc gac tac acc ggg att tac aaa gcc   1145
Val Ile Thr Asn Ala Met Ile Ile Asp Tyr Thr Gly Ile Tyr Lys Ala
295                 300                 305                 310


gac att ggg att aaa aac ggc aaa atc cat ggc att ggc aag gca gga   1193
Asp Ile Gly Ile Lys Asn Gly Lys Ile His Gly Ile Gly Lys Ala Gly
                    315                 320                 325


aac aag gac atg caa gat ggc gta agc cct cat atg gtc gtg ggt gtg   1241
Asn Lys Asp Met Gln Asp Gly Val Ser Pro His Met Val Val Gly Val
                330                 335                 340


ggc aca gaa gca cta gca ggg gaa ggt atg att att acc gct ggg gga   1289
Gly Thr Glu Ala Leu Ala Gly Glu Gly Met Ile Ile Thr Ala Gly Gly
                345                 350                 355


atc gat tca cac acc cac ttc ctt tct cca caa caa ttc cct acc gct   1337
Ile Asp Ser His Thr His Phe Leu Ser Pro Gln Gln Phe Pro Thr Ala
        360                 365                 370


cta gcc aat ggc gtt aca acc atg ttt gga ggc ggc aca ggt cct gta   1385
Leu Ala Asn Gly Val Thr Thr Met Phe Gly Gly Gly Thr Gly Pro Val
375                 380                 385                 390


gat ggc acg aat gcg act act atc act ccg ggc aaa tgg aac ttg cac   1433
Asp Gly Thr Asn Ala Thr Thr Ile Thr Pro Gly Lys Trp Asn Leu His
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cgc atg ttg cgc gca gca gaa gag tat tct atg aat gtg ggc ttt ttg   1481
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3

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Arg Met Leu Arg Ala Ala Glu Glu Tyr Ser Met Asn Val Gly Phe Leu
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ggc aaa ggc aat agc tct agc aaa aaa caa ctt gta gaa caa gta gaa   1529
Gly Lys Gly Asn Ser Ser Ser Lys Lys Gln Leu Val Glu Gln Val Glu
        425                 430             435


gcg ggc gcg att ggt ttt aaa ttg cat gaa gac tgg ggc aca aca cca   1577
Ala Gly Ala Ile Gly Phe Lys Leu His Glu Asp Trp Gly Thr Thr Pro
        440                 445             450


agt gcg atc gat cac tgc ttg agc gtg gca gat gaa tac gat gtg caa   1625
Ser Ala Ile Asp His Cys Leu Ser Val Ala Asp Glu Tyr Asp Val Gln
455                 460             465             470


gtt tgt atc cac acc gat aca gtc aat gag gca ggt tat gta gat gac   1673
Val Cys Ile His Thr Asp Thr Val Asn Glu Ala Gly Tyr Val Asp Asp
                475             480             485


acc cta aat gca atg aac ggg cgc gcc atc cat gcc tac cac att gag   1721
Thr Leu Asn Ala Met Asn Gly Arg Ala Ile His Ala Tyr His Ile Glu
                490             495             500


gga gcg ggt gga gga cac tca cct gat gtt atc acc atg gca ggc gag   1769
Gly Ala Gly Gly Gly His Ser Pro Asp Val Ile Thr Met Ala Gly Glu
        505                 510             515


ctc aat att cta ccc tcc tcc acc acc ccc act att ccc tat acc att   1817
Leu Asn Ile Leu Pro Ser Ser Thr Thr Pro Thr Ile Pro Tyr Thr Ile
        520                 525             530


aat acg gtt gca gaa cac tta gac atg ctc atg aca tgc cac cac cta   1865
Asn Thr Val Ala Glu His Leu Asp Met Leu Met Thr Cys His His Leu
535                 540             545             550


gac aaa cgc atc cgc gag gat tta caa ttt tct caa agc cgt atc cgc   1913
Asp Lys Arg Ile Arg Glu Asp Leu Gln Phe Ser Gln Ser Arg Ile Arg
                555             560             565


ccc ggc tct atc gcg gct gaa gat gtg ctc cat gat atg ggt gtg atc   1961
Pro Gly Ser Ile Ala Ala Glu Asp Val Leu His Asp Met Gly Val Ile
                570             575             580


gcg atg aca agc tcg gat tcg caa gca atg ggg cgt gca ggc gaa gtg   2009
Ala Met Thr Ser Ser Asp Ser Gln Ala Met Gly Arg Ala Gly Glu Val
        585                 590             595


att cct cga act tgg cag act gcg gat aag aat aaa aaa gaa ttt ggt   2057
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4

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Ile Pro Arg Thr Trp Gln Thr Ala Asp Lys Asn Lys Lys Glu Phe Gly
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aag ctt cct gaa gat ggc aaa gat aac gat aat ttc cgc att aag cgc    2105
Lys Leu Pro Glu Asp Gly Lys Asp Asn Asp Asn Phe Arg Ile Lys Arg
615               620               625               630


tac atc tcc aaa tac act atc aac ccc gct ttg acc cac ggc gtg agc    2153
Tyr Ile Ser Lys Tyr Thr Ile Asn Pro Ala Leu Thr His Gly Val Ser
                  635               640               645


gag tat atc ggc tct gtg gaa gag ggc aag atc gcc gac ttg gtg gtg    2201
Glu Tyr Ile Gly Ser Val Glu Glu Gly Lys Ile Ala Asp Leu Val Val
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tgg aat cct gcc ttt ttt ggc gta aaa ccc aaa atc gtg atc aaa ggc    2249
Trp Asn Pro Ala Phe Phe Gly Val Lys Pro Lys Ile Val Ile Lys Gly
                  665               670               675


ggt atg gtg gtc ttc tct gaa atg ggc gat tct aac gcg tct gtg ccc    2297
Gly Met Val Val Phe Ser Glu Met Gly Asp Ser Asn Ala Ser Val Pro
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act ccc caa ccg gtt tat tac cgc gaa atg ttt ggg cat cac ggc aag    2345
Thr Pro Gln Pro Val Tyr Tyr Arg Glu Met Phe Gly His His Gly Lys
695               700               705               710


gcg aaa ttt gac acc agc atc act ttt gtt tcc aaa gtc gcc tat gaa    2393
Ala Lys Phe Asp Thr Ser Ile Thr Phe Val Ser Lys Val Ala Tyr Glu
                  715               720               725


aat ggc gtg aaa gaa aag ctg ggc tta gag cgc caa gtt cta ccg gtc    2441
Asn Gly Val Lys Glu Lys Leu Gly Leu Glu Arg Gln Val Leu Pro Val
                  730               735               740


aaa aac tgc cgt aac atc acc aag aaa gac ttc aag ttc aac gac aaa    2489
Lys Asn Cys Arg Asn Ile Thr Lys Lys Asp Phe Lys Phe Asn Asp Lys
                  745               750               755


acg gca aaa atc acc gtc gat ccg aaa acc ttc gag gtc ttt gta gat    2537
Thr Ala Lys Ile Thr Val Asp Pro Lys Thr Phe Glu Val Phe Val Asp
                  760               765               770


ggc aaa ctc tgc acc tct aaa ccc acc tcg caa gtg cct cta gcc cag    2585
Gly Lys Leu Cys Thr Ser Lys Pro Thr Ser Gln Val Pro Leu Ala Gln
775               780               785               790


cgc tac act ttc ttc tag gcacaatgcc cccttttgggg gcaggttatt          2633
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5

Arg Tyr Thr Phe Phe
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attatattat gcccctcat ttttaaagga gaattatgcg taggtctttg gtattgctat 2813

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Pro Glu Ala Ile Ala Tyr Ile Ser Ala His Ile Met Asp Glu Ala Arg
        35   40   45
Arg Gly Lys Lys Thr Val Ala Gln Leu Met Glu Glu Cys Met His Phe
    50   55   60
Leu Lys Lys Asp Glu Val Met Pro Gly Val Gly Asn Met Val Pro Asp
65   70   75   80
Leu Gly Val Glu Ala Thr Phe Pro Asp Gly Thr Lys Leu Val Thr Val
                85   90   95
Asn Trp Pro Ile Glu Pro Asp Glu His Phe Lys Ala Gly Glu Val Lys
            100   105   110
Phe Gly Cys Asp Lys Asp Ile Glu Leu Asn Ala Gly Lys Glu Val Thr
        115   120   125
Glu Leu Glu Val Thr Asn Glu Gly Pro Lys Ser Leu His Val Gly Ser
    130   135   140
His Phe His Phe Phe Glu Ala Asn Lys Ala Leu Lys Phe Asp Arg Glu
145   150   155   160
Lys Ala Tyr Gly Lys Arg Leu Asp Ile Pro Ser Gly Asn Thr Leu Arg
                165   170   175
Ile Gly Ala Gly Gln Thr Arg Lys Val Gln Leu Ile Pro Leu Gly Gly
            180   185   190
Ser Lys Lys Val Ile Gly Met Asn Gly Leu Val Asn Asn Ile Ala Asp
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Glu Arg His Lys His Lys Ala Leu Asp Lys Ala Lys Ser His Gly Phe
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            20   25   30
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        35   40   45
Thr Ile Arg Glu Gly Met Gly Gln Ser Asn Ser Pro Asp Glu Asn Thr
    50   55   60
Leu Asp Leu Val Ile Thr Asn Ala Met Ile Ile Asp Tyr Thr Gly Ile
65   70   75   80
Tyr Lys Ala Asp Ile Gly Ile Lys Asn Gly Lys Ile His Gly Ile Gly
                85   90   95
Lys Ala Gly Asn Lys Asp Met Gln Asp Gly Val Ser Pro His Met Val
            100   105   110
Val Gly Val Gly Thr Glu Ala Leu Ala Gly Glu Gly Met Ile Ile Thr
        115   120   125
Ala Gly Gly Ile Asp Ser His Thr His Phe Leu Ser Pro Gln Gln Phe
    130   135   140
Pro Thr Ala Leu Ala Asn Gly Val Thr Thr Met Phe Gly Gly Gly Thr
145   150   155   160
Gly Pro Val Asp Gly Thr Asn Ala Thr Thr Ile Thr Pro Gly Lys Trp
                165   170   175
Asn Leu His Arg Met Leu Arg Ala Ala Glu Glu Tyr Ser Met Asn Val
                180   185   190
Gly Phe Leu Gly Lys Gly Asn Ser Ser Ser Lys Lys Gln Leu Val Glu
            195   200   205
Gln Val Glu Ala Gly Ala Ile Gly Phe Lys Leu His Glu Asp Trp Gly
        210   215   220
Thr Thr Pro Ser Ala Ile Asp His Cys Leu Ser Val Ala Asp Glu Tyr
225   230   235   240
Asp Val Gln Val Cys Ile His Thr Asp Thr Val Asn Glu Ala Gly Tyr
                245   250   255
Val Asp Asp Thr Leu Asn Ala Met Asn Gly Arg Ala Ile His Ala Tyr
                260   265   270
His Ile Glu Gly Ala Gly Gly Gly His Ser Pro Asp Val Ile Thr Met
        275   280   285
Ala Gly Glu Leu Asn Ile Leu Pro Ser Ser Thr Thr Pro Thr Ile Pro
290   295   300

7

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Tyr Thr Ile Asn Thr Val Ala Glu His Leu Asp Met Leu Met Thr Cys
305             310             315             320
His His Leu Asp Lys Arg Ile Arg Glu Asp Leu Gln Phe Ser Gln Ser
            325             330             335
Arg Ile Arg Pro Gly Ser Ile Ala Ala Glu Asp Val Leu His Asp Met
            340             345             350
Gly Val Ile Ala Met Thr Ser Ser Asp Ser Gln Ala Met Gly Arg Ala
        355             360             365
Gly Glu Val Ile Pro Arg Thr Trp Gln Thr Ala Asp Lys Asn Lys Lys
    370             375             380
Glu Phe Gly Lys Leu Pro Glu Asp Gly Lys Asp Asn Asp Asn Phe Arg
385             390             395             400
Ile Lys Arg Tyr Ile Ser Lys Tyr Thr Ile Asn Pro Ala Leu Thr His
            405             410             415
Gly Val Ser Glu Tyr Ile Gly Ser Val Glu Glu Gly Lys Ile Ala Asp
        420             425             430
Leu Val Val Trp Asn Pro Ala Phe Phe Gly Val Lys Pro Lys Ile Val
        435             440             445
Ile Lys Gly Gly Met Val Val Phe Ser Glu Met Gly Asp Ser Asn Ala
    450             455             460
Ser Val Pro Thr Pro Gln Pro Val Tyr Tyr Arg Glu Met Phe Gly His
465             470             475             480
His Gly Lys Ala Lys Phe Asp Thr Ser Ile Thr Phe Val Ser Lys Val
            485             490             495
Ala Tyr Glu Asn Gly Val Lys Glu Lys Leu Gly Leu Glu Arg Gln Val
            500             505             510
Leu Pro Val Lys Asn Cys Arg Asn Ile Thr Lys Lys Asp Phe Lys Phe
        515             520             525
Asn Asp Lys Thr Ala Lys Ile Thr Val Asp Pro Lys Thr Phe Glu Val
    530             535             540
Phe Val Asp Gly Lys Leu Cys Thr Ser Lys Pro Thr Ser Gln Val Pro
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ggc gaa gtg gct aga aag cgc aaa gca gag ggc tta aag ctc aat caa      96
Gly Glu Val Ala Arg Lys Arg Lys Ala Glu Gly Leu Lys Leu Asn Gln
            20                  25                  30

ccc gaa gcc att gcc tac att agt gcc cat att atg gac gag gcg cgc     144
Pro Glu Ala Ile Ala Tyr Ile Ser Ala His Ile Met Asp Glu Ala Arg
        35                  40                  45

cgt ggc aaa aaa acc gtt gct gaa ctt atg gaa gaa tgt atg cac ttt     192
Arg Gly Lys Lys Thr Val Ala Glu Leu Met Glu Glu Cys Met His Phe
    50                  55                  60

ttg aaa aaa gat gag gtg atg ccc ggt gtg ggg aat atg gtc cct gat     240
Leu Lys Lys Asp Glu Val Met Pro Gly Val Gly Asn Met Val Pro Asp
65                  70                  75                  80

ttg ggc gta gaa gcc act ttc ccc gat ggc acc aaa ctc gta acc gtg     288
Leu Gly Val Glu Ala Thr Phe Pro Asp Gly Thr Lys Leu Val Thr Val
                85                  90                  95

aat tgg ccc att gaa cct gat gaa cac ttt aaa gcc ggt gaa gtg aaa     336
Asn Trp Pro Ile Glu Pro Asp Glu His Phe Lys Ala Gly Glu Val Lys
            100                 105                 110

ttt ggc tgt gat aaa gac att gag ctc aac gcg ggt aag gaa gtt acc     384
Phe Gly Cys Asp Lys Asp Ile Glu Leu Asn Ala Gly Lys Glu Val Thr
        115                 120                 125

gag ctt gaa gtt acc aac gaa gga cct aaa tcc ttg cat gtg ggt agc     432
Glu Leu Glu Val Thr Asn Glu Gly Pro Lys Ser Leu His Val Gly Ser
    130                 135                 140

cat ttc cac ttc ttt gaa acc aac aag gca ttg aaa ttc gat cgg gaa     480
His Phe His Phe Phe Glu Thr Asn Lys Ala Leu Lys Phe Asp Arg Glu
145                 150                 155                 160

aaa gcc tat ggc aaa cgc cta gat att ccc tct ggc aac acg cta cgc     528
Lys Ala Tyr Gly Lys Arg Leu Asp Ile Pro Ser Gly Asn Thr Leu Arg
                165                 170                 175

att ggg gca gga caa acc cgt aaa gtg cag tta atc cct ctt ggc ggt     576
Ile Gly Ala Gly Gln Thr Arg Lys Val Gln Leu Ile Pro Leu Gly Gly
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Ile Gly Ala Gly Gln Thr Arg Lys Val Gln Leu Ile Pro Leu Gly Gly
        180   185   190

agt aaa aaa gtg att ggc atg aac ggg ctt gtg aat aat att gcg gac   624
Ser Lys Lys Val Ile Gly Met Asn Gly Leu Val Asn Asn Ile Ala Asp
        195   200   205

gaa cgc cat aaa cac aaa gca cta gac aag gca aaa tct cac gga ttc   672
Glu Arg His Lys His Lys Ala Leu Asp Lys Ala Lys Ser His Gly Phe
        210   215   220

atc aag taa ggagactccc atg aaa atg aaa aaa caa gag tat gta aac   721
Ile Lys   Met Lys Met Lys Lys Gln Glu Tyr Val Asn
225   230   235

acc tac gga ccc acc aca ggc gat aaa gtg cgc tta gga gat acc gat   769
Thr Tyr Gly Pro Thr Thr Gly Asp Lys Val Arg Leu Gly Asp Thr Asp
        240   245   250

ctt tgg gca gaa gta gaa cat gac tat acc act tat ggc gaa gag ctc   817
Leu Trp Ala Glu Val Glu His Asp Tyr Thr Thr Tyr Gly Glu Glu Leu
        255   260   265

aaa ttt ggc gcg ggt aaa act atc cgt gag ggt atg ggt cag agc aat   865
Lys Phe Gly Ala Gly Lys Thr Ile Arg Glu Gly Met Gly Gln Ser Asn
270   275   280   285

agc cca gat gaa aac acc tta gat tta gtg atc acc aac gcg atg att   913
Ser Pro Asp Glu Asn Thr Leu Asp Leu Val Ile Thr Asn Ala Met Ile
                290   295   300

atc gac tac acc ggg att tat aaa gcc gac att ggt att aaa aat ggc   961
Ile Asp Tyr Thr Gly Ile Tyr Lys Ala Asp Ile Gly Ile Lys Asn Gly
                305   310   315

aaa atc cat ggt att ggc aag gcg ggg aac aaa gac atg caa gat ggc   1009
Lys Ile His Gly Ile Gly Lys Ala Gly Asn Lys Asp Met Gln Asp Gly
        320   325   330

gta agc cct cat atg gtc gtg ggt gtg ggc aca gaa gca cta gca ggg   1057
Val Ser Pro His Met Val Val Gly Val Gly Thr Glu Ala Leu Ala Gly
        335   340   345

gaa ggt atg att att acc gct ggg ggg atc gat tcg cac acc cac ttc   1105
Glu Gly Met Ile Ile Thr Ala Gly Gly Ile Asp Ser His Thr His Phe
350   355   360   365

ctc tct ccc caa caa ttc cct acc gct cta gcc aat ggt gtt aca acc   1153

10

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Leu Ser Pro Gln Gln Phe Pro Thr Ala Leu Ala Asn Gly Val Thr Thr
        370             375         .       380


atg ttt gga ggt ggc aca ggt ccg gta gat ggc acg aat gcg acc acc     1201
Met Phe Gly Gly Gly Thr Gly Pro Val Asp Gly Thr Asn Ala Thr Thr
            385             390             395


atc act ccg ggc aaa tgg aac ttg cac cgc atg ttg cgc gca gct gaa     1249
Ile Thr Pro Gly Lys Trp Asn Leu His Arg Met Leu Arg Ala Ala Glu
            400             405             410


gag tat tct atg aat gtg ggc ttt ttg ggc aaa ggc aat agc tcc agt     1297
Glu Tyr Ser Met Asn Val Gly Phe Leu Gly Lys Gly Asn Ser Ser Ser
        415             420             425


aaa aaa caa ctc gta gaa caa gta gaa gcg ggc gcg att ggc ttt aaa     1345
Lys Lys Gln Leu Val Glu Gln Val Glu Ala Gly Ala Ile Gly Phe Lys
430             435             440             445


ttg cat gaa gac tgg ggc aca aca cca agt gcg atc gat cac tgc ttg     1393
Leu His Glu Asp Trp Gly Thr Thr Pro Ser Ala Ile Asp His Cys Leu
                450             455             460


agc gta gca gat gaa tac gat gtg caa gtt tgt atc cac acc gat acg     1441
Ser Val Ala Asp Glu Tyr Asp Val Gln Val Cys Ile His Thr Asp Thr
            465             470             475


gtc aat gag gca ggt tat gta gat gac acc cta aat gcg atg aac ggg     1489
Val Asn Glu Ala Gly Tyr Val Asp Asp Thr Leu Asn Ala Met Asn Gly
        480             485             490


cgc gcc atc cat gcc tac cac att gag gga gcg ggc gga gga cac tca     1537
Arg Ala Ile His Ala Tyr His Ile Glu Gly Ala Gly Gly Gly His Ser
        495             500             505


cct gat gtt atc acc atg gca ggc gag ctc aat att cta ccc tcc tcc     1585
Pro Asp Val Ile Thr Met Ala Gly Glu Leu Asn Ile Leu Pro Ser Ser
510             515             520             525


acc acc ccc act att ccc tat acc att aat acg gtt gca gaa cac tta     1633
Thr Thr Pro Thr Ile Pro Tyr Thr Ile Asn Thr Val Ala Glu His Leu
            530             535             540


gac atg ctc atg acc tgc cac cac cta gac aaa cgc atc cgc gag gat     1681
Asp Met Leu Met Thr Cys His His Leu Asp Lys Arg Ile Arg Glu Asp
            545             550             555


ctc cag ttt tcc caa agc cgt atc cgc ccc ggc tct att gcc gct gaa     1729


                            11
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Leu Gln Phe Ser Gln Ser Arg Ile Arg Pro Gly Ser Ile Ala Ala Glu
    560               565               570

gat gtg ctc cat gat att ggc gtg atc gcg atg aca agc tcg gat tcg    1777
Asp Val Leu His Asp Ile Gly Val Ile Ala Met Thr Ser Ser Asp Ser
    575               580               585

caa gca atg ggg cgc gct ggg gaa gtg att cct aga act tgg caa act    1825
Gln Ala Met Gly Arg Ala Gly Glu Val Ile Pro Arg Thr Trp Gln Thr
590           595               600               605

gca gac aag aat aaa aaa gaa ttt ggt aag ctt cct gaa gat ggt gca    1873
Ala Asp Lys Asn Lys Lys Glu Phe Gly Lys Leu Pro Glu Asp Gly Ala
              610               615               620

gat aat gac aac ttc cgc atc aaa cgc tat atc tcc aaa tac acc att    1921
Asp Asn Asp Asn Phe Arg Ile Lys Arg Tyr Ile Ser Lys Tyr Thr Ile
              625               630               635

aat ccc gct ttg acc cat ggc gtg agc gag tat atc ggc tct gtg gaa    1969
Asn Pro Ala Leu Thr His Gly Val Ser Glu Tyr Ile Gly Ser Val Glu
              640               645               650

gag ggc aag atc gcc gac ttg gtg gtg tgg aat cct gct ttc ttt ggt    2017
Glu Gly Lys Ile Ala Asp Leu Val Val Trp Asn Pro Ala Phe Phe Gly
    655               660               665

gta aaa ccc aaa atc gtg atc aaa ggc ggt atg gtg gtg ttc tct gaa    2065
Val Lys Pro Lys Ile Val Ile Lys Gly Gly Met Val Val Phe Ser Glu
670               675               680               685

atg ggc gat tct aac gcg tct gtg ccc aca cct cag ccg gtt tat tac    2113
Met Gly Asp Ser Asn Ala Ser Val Pro Thr Pro Gln Pro Val Tyr Tyr
              690               695               700

cgc gaa atg ttt ggg cat cac ggc aag gcg aaa ttt gac acc agc atc    2161
Arg Glu Met Phe Gly His His Gly Lys Ala Lys Phe Asp Thr Ser Ile
              705               710               715

act ttt gtt tcc aaa gtc gcc tat gaa aat ggc gtg aaa gaa aaa cta    2209
Thr Phe Val Ser Lys Val Ala Tyr Glu Asn Gly Val Lys Glu Lys Leu
              720               725               730

ggc tta gag cgc aag gtg cta ccc gtg aaa aac tgc cgc aac atc act    2257
Gly Leu Glu Arg Lys Val Leu Pro Val Lys Asn Cys Arg Asn Ile Thr
    735               740               745

aag aaa gac ttc aaa ttc aac aac aag acg gcg cat atc act gtc gat    2305
```

12

```
Lys Lys Asp Phe Lys Phe Asn Asn Lys Thr Ala His Ile Thr Val Asp
750             755             760                 765


cct aaa acc ttc gag gtc ttt gta gat ggc aaa ctc tgc acc tct aaa      2353
Pro Lys Thr Phe Glu Val Phe Val Asp Gly Lys Leu Cys Thr Ser Lys
            770                 775             780


ccc gcc tct gaa gtg cct cta gcc caa cgc tac act ttc ttc tag          2398
Pro Ala Ser Glu Val Pro Leu Ala Gln Arg Tyr Thr Phe Phe
            785                 790             795

                                                                     2405

gcacaat


<210> 5
<211> 226
<212> PRT
<213> Helicobacter felis


<400> 5
Val Lys Leu Thr Pro Lys Glu Gln Glu Lys Phe Leu Leu Tyr Tyr Ala
 1               5                   10                  15
Gly Glu Val Ala Arg Lys Arg Lys Ala Glu Gly Leu Lys Leu Asn Gln
            20                  25                  30
Pro Glu Ala Ile Ala Tyr Ile Ser Ala His Ile Met Asp Glu Ala Arg
            35                  40                  45
Arg Gly Lys Lys Thr Val Ala Glu Leu Met Glu Glu Cys Met His Phe
        50                  55                  60
Leu Lys Lys Asp Glu Val Met Pro Gly Val Gly Asn Met Val Pro Asp
65                  70                  75                  80
Leu Gly Val Glu Ala Thr Phe Pro Asp Gly Thr Lys Leu Val Thr Val
                85                  90                  95
Asn Trp Pro Ile Glu Pro Asp Glu His Phe Lys Ala Gly Glu Val Lys
            100                 105                 110
Phe Gly Cys Asp Lys Asp Ile Glu Leu Asn Ala Gly Lys Glu Val Thr
            115                 120                 125
Glu Leu Glu Val Thr Asn Glu Gly Pro Lys Ser Leu His Val Gly Ser
    130                 135                 140
His Phe His Phe Phe Glu Thr Asn Lys Ala Leu Lys Phe Asp Arg Glu
145                 150                 155                 160
Lys Ala Tyr Gly Lys Arg Leu Asp Ile Pro Ser Gly Asn Thr Leu Arg
                165                 170                 175
Ile Gly Ala Gly Gln Thr Arg Lys Val Gln Leu Ile Pro Leu Gly Gly
            180                 185                 190
Ser Lys Lys Val Ile Gly Met Asn Gly Leu Val Asn Asn Ile Ala Asp
            195                 200                 205
Glu Arg His Lys His Lys Ala Leu Asp Lys Ala Lys Ser His Gly Phe
    210                 215                 220
```

Ile Lys
225

<210> 6
<211> 568
<212> PRT
<213> Helicobacter felis

<400> 6
Met Lys Met Lys Lys Gln Glu Tyr Val Asn Thr Tyr Gly Pro Thr Thr
1   5   10   15
Gly Asp Lys Val Arg Leu Gly Asp Thr Asp Leu Trp Ala Glu Val Glu
                20   25   30
His Asp Tyr Thr Thr Tyr Gly Glu Glu Leu Lys Phe Gly Ala Gly Lys
            35   40   45
Thr Ile Arg Glu Gly Met Gly Gln Ser Asn Ser Pro Asp Glu Asn Thr
        50   55   60
Leu Asp Leu Val Ile Thr Asn Ala Met Ile Ile Asp Tyr Thr Gly Ile
65   70   75   80
Tyr Lys Ala Asp Ile Gly Ile Lys Asn Gly Lys Ile His Gly Ile Gly
                85   90   95
Lys Ala Gly Asn Lys Asp Met Gln Asp Gly Val Ser Pro His Met Val
            100   105   110
Val Gly Val Gly Thr Glu Ala Leu Ala Gly Glu Gly Met Ile Ile Thr
        115   120   125
Ala Gly Gly Ile Asp Ser His Thr His Phe Leu Ser Pro Gln Gln Phe
        130   135   140
Pro Thr Ala Leu Ala Asn Gly Val Thr Thr Met Phe Gly Gly Gly Thr
145   150   155   160
Gly Pro Val Asp Gly Thr Asn Ala Thr Thr Ile Thr Pro Gly Lys Trp
                165   170   175
Asn Leu His Arg Met Leu Arg Ala Ala Glu Glu Tyr Ser Met Asn Val
            180   185   190
Gly Phe Leu Gly Lys Gly Asn Ser Ser Ser Lys Lys Gln Leu Val Glu
        195   200   205
Gln Val Glu Ala Gly Ala Ile Gly Phe Lys Leu His Glu Asp Trp Gly
    210   215   220
Thr Thr Pro Ser Ala Ile Asp His Cys Leu Ser Val Ala Asp Glu Tyr
225   230   235   240
Asp Val Gln Val Cys Ile His Thr Asp Thr Val Asn Glu Ala Gly Tyr
                245   250   255
Val Asp Asp Thr Leu Asn Ala Met Asn Gly Arg Ala Ile His Ala Tyr
            260   265   270
His Ile Glu Gly Ala Gly Gly Gly His Ser Pro Asp Val Ile Thr Met
        275   280   285
Ala Gly Glu Leu Asn Ile Leu Pro Ser Ser Thr Thr Pro Thr Ile Pro
        290   295   300

14

Tyr Thr Ile Asn Thr Val Ala Glu His Leu Asp Met Leu Met Thr Cys
305   310   315   320
His His Leu Asp Lys Arg Ile Arg Glu Asp Leu Gln Phe Ser Gln Ser
                325   330   335
Arg Ile Arg Pro Gly Ser Ile Ala Ala Glu Asp Val Leu His Asp Ile
            340   345   350
Gly Val Ile Ala Met Thr Ser Ser Asp Ser Gln Ala Met Gly Arg Ala
            355   360   365
Gly Glu Val Ile Pro Arg Thr Trp Gln Thr Ala Asp Lys Asn Lys Lys
        370   375   380
Glu Phe Gly Lys Leu Pro Glu Asp Gly Ala Asp Asn Asp Asn Phe Arg
385   390   395   400
Ile Lys Arg Tyr Ile Ser Lys Tyr Thr Ile Asn Pro Ala Leu Thr His
                405   410   415
Gly Val Ser Glu Tyr Ile Gly Ser Val Glu Glu Gly Lys Ile Ala Asp
            420   425   430
Leu Val Val Trp Asn Pro Ala Phe Phe Gly Val Lys Pro Lys Ile Val
            435   440   445
Ile Lys Gly Gly Met Val Val Phe Ser Glu Met Gly Asp Ser Asn Ala
        450   455   460
Ser Val Pro Thr Pro Gln Pro Val Tyr Tyr Arg Glu Met Phe Gly His
465   470   475   480
His Gly Lys Ala Lys Phe Asp Thr Ser Ile Thr Phe Val Ser Lys Val
                485   490   495
Ala Tyr Glu Asn Gly Val Lys Glu Lys Leu Gly Leu Glu Arg Lys Val
            500   505   510
Leu Pro Val Lys Asn Cys Arg Asn Ile Thr Lys Lys Asp Phe Lys Phe
            515   520   525
Asn Asn Lys Thr Ala His Ile Thr Val Asp Pro Lys Thr Phe Glu Val
        530   535   540
Phe Val Asp Gly Lys Leu Cys Thr Ser Lys Pro Ala Ser Glu Val Pro
545   550   555   560
Leu Ala Gln Arg Tyr Thr Phe Phe
            565

<210> 7
<211> 2183
<212> DNA
<213> Helicobacter felis

<220>
<221> CDS
<222> (3)..(683)

<220>
<221> CDS

15

<222> (694)..(2181)

<400> 7

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tc gtg aaa ctc aca ccc aaa gag caa gaa aag ttc ttg tta tat tat       47
   Val Lys Leu Thr Pro Lys Glu Gln Glu Lys Phe Leu Leu Tyr Tyr
    1               5                   10                  15


gcg ggc gaa gtg gct aga aag cgc aaa gca gag ggc tta aag ctc aat      95
Ala Gly Glu Val Ala Arg Lys Arg Lys Ala Glu Gly Leu Lys Leu Asn
                20                  25                  30


caa ccc gaa gcc att gcc tac att agt gcc cat att atg gac gag gcg     143
Gln Pro Glu Ala Ile Ala Tyr Ile Ser Ala His Ile Met Asp Glu Ala
            35                  40                  45


cgc cgt ggc aaa aaa acc gtt gct gaa ctt atg gaa gaa tgt atg cac     191
Arg Arg Gly Lys Lys Thr Val Ala Glu Leu Met Glu Glu Cys Met His
        50                  55                  60


ttt ttg aaa aaa gat gag gtg atg ccc ggt gtg ggg aat atg gtc cct     239
Phe Leu Lys Lys Asp Glu Val Met Pro Gly Val Gly Asn Met Val Pro
    65                  70                  75


gat ttg ggc gta gaa gcc act ttc ccc gat ggc acc aaa ctc gta acc     287
Asp Leu Gly Val Glu Ala Thr Phe Pro Asp Gly Thr Lys Leu Val Thr
80                  85                  90                   95


gtg aat tgg ccc att gaa cct gat gaa cac ttt aaa gcc ggt gaa gtg     335
Val Asn Trp Pro Ile Glu Pro Asp Glu His Phe Lys Ala Gly Glu Val
                100                 105                 110


aaa ttt ggc tgt gat aaa gac att gag ctc aac gtg ggt aag gaa gtt     383
Lys Phe Gly Cys Asp Lys Asp Ile Glu Leu Asn Val Gly Lys Glu Val
                115                 120                 125


acc gag ctt gaa gtt acc aac gaa gga cct aaa tcc ttg cat gtg ggt     431
Thr Glu Leu Glu Val Thr Asn Glu Gly Pro Lys Ser Leu His Val Gly
            130                 135                 140


agc cat ttc cac ttc ttt gaa acc aac aag gca ttg aaa ttc gat cgg     479
Ser His Phe His Phe Phe Glu Thr Asn Lys Ala Leu Lys Phe Asp Arg
        145                 150                 155


gaa aaa gcc tat ggc aaa cgc cta gat att ccc tct ggc aac acg cta     527
Glu Lys Ala Tyr Gly Lys Arg Leu Asp Ile Pro Ser Gly Asn Thr Leu
160                 165                 170                 175


cgc att ggg gca gga caa acc cgt aaa gtg cag tta atc cct ctt ggc     575
```

Arg Ile Gly Ala Gly Gln Thr Arg Lys Val Gln Leu Ile Pro Leu Gly
                180   185   190

ggt agt aaa aaa gtg att ggc atg aac ggg ctt gtg aat aat att gcg   623
Gly Ser Lys Lys Val Ile Gly Met Asn Gly Leu Val Asn Asn Ile Ala
            195   200   205

gac gaa cgc cat aaa cac aaa gca cta gac aag gca aaa tct cac gga   671
Asp Glu Arg His Lys His Lys Ala Leu Asp Lys Ala Lys Ser His Gly
            210   215   220

ttc atc aag taa ggagactccc atg aaa atg aaa aaa caa gag tat gta   720
Phe Ile Lys   Met Lys Met Lys Lys Gln Glu Tyr Val
        225   230   235

aac acc tac gga ccc acc aca ggc gat aaa gtg cgc tta gga gat acc   768
Asn Thr Tyr Gly Pro Thr Thr Gly Asp Lys Val Arg Leu Gly Asp Thr
                240   245   250

gat ctt tgg gca gaa gta gaa cat gac tat acc act tat ggc gaa gag   816
Asp Leu Trp Ala Glu Val Glu His Asp Tyr Thr Thr Tyr Gly Glu Glu
            255   260   265

ctc aaa ttt ggc gcg ggt aaa act atc cgt gag ggt atg ggt cag agc   864
Leu Lys Phe Gly Ala Gly Lys Thr Ile Arg Glu Gly Met Gly Gln Ser
        270   275   280

aat agc cca gat gaa aac acc tta gat tta gtg atc acc aac gcg atg   912
Asn Ser Pro Asp Glu Asn Thr Leu Asp Leu Val Ile Thr Asn Ala Met
285   290   295   300

att atc gac tac acc ggg att tat aaa gcc gac att ggt att aaa aat   960
Ile Ile Asp Tyr Thr Gly Ile Tyr Lys Ala Asp Ile Gly Ile Lys Asn
                305   310   315

ggc aaa atc cat ggt att ggc aag gcg ggg aac aaa gac atg caa gat   1008
Gly Lys Ile His Gly Ile Gly Lys Ala Gly Asn Lys Asp Met Gln Asp
            320   325   330

ggc gta agc cct cat atg gtc gtg ggt gtg ggc aca gaa gca cta gca   1056
Gly Val Ser Pro His Met Val Val Gly Val Gly Thr Glu Ala Leu Ala
            335   340   345

ggg gaa ggt atg att att acc gct ggg ggg atc gat tcg cac acc cac   1104
Gly Glu Gly Met Ile Ile Thr Ala Gly Gly Ile Asp Ser His Thr His
        350   355   360

ttc ctc tct ccc caa caa ttc cct acc gct cta gcc aat ggt gtt aca   1152

17

```
Phe Leu Ser Pro Gln Gln Phe Pro Thr Ala Leu Ala Asn Gly Val Thr
365                 370             375                 380


acc atg ttt gga ggt ggc aca ggt ccg gta gat ggc acg aat gcg acc   1200
Thr Met Phe Gly Gly Gly Thr Gly Pro Val Asp Gly Thr Asn Ala Thr
                385                 390                 395


acc atc act ccg ggc aaa tgg aac ttg cac cgc atg ttg cgc gca gct   1248
Thr Ile Thr Pro Gly Lys Trp Asn Leu His Arg Met Leu Arg Ala Ala
                400                 405                 410


gaa gag tat tct atg aat gta ggc ttt ttg ggc aaa ggc aat agt tct   1296
Glu Glu Tyr Ser Met Asn Val Gly Phe Leu Gly Lys Gly Asn Ser Ser
                415                 420                 425


agc aaa aaa caa ctt gta gaa caa gta gaa gcg ggc gcg att ggc ttt   1344
Ser Lys Lys Gln Leu Val Glu Gln Val Glu Ala Gly Ala Ile Gly Phe
                430                 435                 440


aaa ttg cat gaa gac tgg ggc aca aca cca agt gcg atc gat cac tgc   1392
Lys Leu His Glu Asp Trp Gly Thr Thr Pro Ser Ala Ile Asp His Cys
445                 450                 455                 460


ttg agc gtg gca gat gaa tac gat gtg caa gtt tgt atc cac acc gat   1440
Leu Ser Val Ala Asp Glu Tyr Asp Val Gln Val Cys Ile His Thr Asp
                465                 470                 475


acg gtc aat gag gca ggt tat gtg gat gac acc cta aat gca atg aac   1488
Thr Val Asn Glu Ala Gly Tyr Val Asp Asp Thr Leu Asn Ala Met Asn
                480                 485                 490


ggg cgc gcc atc cat gcc tac cac att gag gga gcg ggc gga gga cac   1536
Gly Arg Ala Ile His Ala Tyr His Ile Glu Gly Ala Gly Gly Gly His
                495                 500                 505


tca cct gat gtt atc acc atg gca ggc gag ctc aat att cta ccc tcc   1584
Ser Pro Asp Val Ile Thr Met Ala Gly Glu Leu Asn Ile Leu Pro Ser
                510                 515                 520


tcc acc acc ccc act att ccc tat acc att aat acg gtt gca gaa cac   1632
Ser Thr Thr Pro Thr Ile Pro Tyr Thr Ile Asn Thr Val Ala Glu His
525                 530                 535                 540


tta gac atg ctc atg acc tgc cac cac cta gat aag cgc atc cgc gag   1680
Leu Asp Met Leu Met Thr Cys His His Leu Asp Lys Arg Ile Arg Glu
                545                 550                 555


gat tta caa ttt tct caa agc cgt atc cgc ccc gga tct att gcc gct   1728
```

18

```
Asp Leu Gln Phe Ser Gln Ser Arg Ile Arg Pro Gly Ser Ile Ala Ala
            560             565             570


gag gat gtg ctc cat gat att ggc gtg atc gcg atg act agc tcc gat    1776
Glu Asp Val Leu His Asp Ile Gly Val Ile Ala Met Thr Ser Ser Asp
            575             580             585


tcg caa gca atg ggg cgc gct ggg gaa gtg att cct aga act tgg caa    1824
Ser Gln Ala Met Gly Arg Ala Gly Glu Val Ile Pro Arg Thr Trp Gln
            590             595             600


act gca gat aag aat aaa aaa gaa ttt ggt aag ctt cct gaa gat ggt    1872
Thr Ala Asp Lys Asn Lys Lys Glu Phe Gly Lys Leu Pro Glu Asp Gly
605             610             615             620


gca gat aac gac aac ttc cgc atc aaa cgc tat atc tcc aaa tac acc    1920
Ala Asp Asn Asp Asn Phe Arg Ile Lys Arg Tyr Ile Ser Lys Tyr Thr
                625             630             635


att aat ccc gct ttg acc cat ggc gtg agc gag tat atc ggc tct gtg    1968
Ile Asn Pro Ala Leu Thr His Gly Val Ser Glu Tyr Ile Gly Ser Val
            640             645             650


gaa gag ggc aag atc gcc gac ttg gtg gtg tgg aat cct gcc ttt ttt    2016
Glu Glu Gly Lys Ile Ala Asp Leu Val Val Trp Asn Pro Ala Phe Phe
            655             660             665


ggc gtg aaa cct aag att gtg att aaa ggt ggc atg gtg gtc ttc tct    2064
Gly Val Lys Pro Lys Ile Val Ile Lys Gly Gly Met Val Val Phe Ser
            670             675             680


gaa atg ggc gat tct aac gcg tcc gtg ccc acg cct cag ccg gtt tat    2112
Glu Met Gly Asp Ser Asn Ala Ser Val Pro Thr Pro Gln Pro Val Tyr
685             690             695             700


tac cgc gaa atg ttt ggg cac cac ggc aag gcg aaa ttt gac acc agc    2160
Tyr Arg Glu Met Phe Gly His His Gly Lys Ala Lys Phe Asp Thr Ser
                705             710             715


atc act ttt cgt gtc tca agc gg                                     2183
Ile Thr Phe Arg Val Ser Ser
            720


<210> 8
<211> 226
<212> PRT
<213> Helicobacter felis
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19

<400> 8
Val Lys Leu Thr Pro Lys Glu Gln Glu Lys Phe Leu Leu Tyr Tyr Ala
1   5   10   15
Gly Glu Val Ala Arg Lys Arg Lys Ala Glu Gly Leu Lys Leu Asn Gln
            20   25   30
Pro Glu Ala Ile Ala Tyr Ile Ser Ala His Ile Met Asp Glu Ala Arg
            35   40   45
Arg Gly Lys Lys Thr Val Ala Glu Leu Met Glu Glu Cys Met His Phe
        50   55   60
Leu Lys Lys Asp Glu Val Met Pro Gly Val Gly Asn Met Val Pro Asp
65   70   75   80
Leu Gly Val Glu Ala Thr Phe Pro Asp Gly Thr Lys Leu Val Thr Val
                85   90   95
Asn Trp Pro Ile Glu Pro Asp Glu His Phe Lys Ala Gly Glu Val Lys
                100   105   110
Phe Gly Cys Asp Lys Asp Ile Glu Leu Asn Val Gly Lys Glu Val Thr
            115   120   125
Glu Leu Glu Val Thr Asn Glu Gly Pro Lys Ser Leu His Val Gly Ser
    130   135   140
His Phe His Phe Phe Glu Thr Asn Lys Ala Leu Lys Phe Asp Arg Glu
145   150   155   160
Lys Ala Tyr Gly Lys Arg Leu Asp Ile Pro Ser Gly Asn Thr Leu Arg
                165   170   175
Ile Gly Ala Gly Gln Thr Arg Lys Val Gln Leu Ile Pro Leu Gly Gly
            180   185   190
Ser Lys Lys Val Ile Gly Met Asn Gly Leu Val Asn Asn Ile Ala Asp
        195   200   205
Glu Arg His Lys His Lys Ala Leu Asp Lys Ala Lys Ser His Gly Phe
210   215   220
Ile Lys
225

<210> 9
<211> 496
<212> PRT
<213> Helicobacter felis

<400> 9
Met Lys Met Lys Lys Gln Glu Tyr Val Asn Thr Tyr Gly Pro Thr Thr
1   5   10   15
Gly Asp Lys Val Arg Leu Gly Asp Thr Asp Leu Trp Ala Glu Val Glu
            20   25   30
His Asp Tyr Thr Thr Tyr Gly Glu Glu Leu Lys Phe Gly Ala Gly Lys
            35   40   45
Thr Ile Arg Glu Gly Met Gly Gln Ser Asn Ser Pro Asp Glu Asn Thr
        50   55   60

20

```
Leu Asp Leu Val Ile Thr Asn Ala Met Ile Ile Asp Tyr Thr Gly Ile
65                  70              75                      80
Tyr Lys Ala Asp Ile Gly Ile Lys Asn Gly Lys Ile His Gly Ile Gly
            85              90              95
Lys Ala Gly Asn Lys Asp Met Gln Asp Gly Val Ser Pro His Met Val
            100             105             110
Val Gly Val Gly Thr Glu Ala Leu Ala Gly Glu Gly Met Ile Ile Thr
        115             120             125
Ala Gly Gly Ile Asp Ser His Thr His Phe Leu Ser Pro Gln Gln Phe
    130             135             140
Pro Thr Ala Leu Ala Asn Gly Val Thr Thr Met Phe Gly Gly Gly Thr
145             150             155             160
Gly Pro Val Asp Gly Thr Asn Ala Thr Thr Ile Thr Pro Gly Lys Trp
            165             170             175
Asn Leu His Arg Met Leu Arg Ala Ala Glu Glu Tyr Ser Met Asn Val
            180             185             190
Gly Phe Leu Gly Lys Gly Asn Ser Ser Ser Lys Lys Gln Leu Val Glu
        195             200             205
Gln Val Glu Ala Gly Ala Ile Gly Phe Lys Leu His Glu Asp Trp Gly
    210             215             220
Thr Thr Pro Ser Ala Ile Asp His Cys Leu Ser Val Ala Asp Glu Tyr
225             230             235             240
Asp Val Gln Val Cys Ile His Thr Asp Thr Val Asn Glu Ala Gly Tyr
            245             250             255
Val Asp Asp Thr Leu Asn Ala Met Asn Gly Arg Ala Ile His Ala Tyr
            260             265             270
His Ile Glu Gly Ala Gly Gly Gly His Ser Pro Asp Val Ile Thr Met
    275             280             285
Ala Gly Glu Leu Asn Ile Leu Pro Ser Ser Thr Thr Pro Thr Ile Pro
    290             295             300
Tyr Thr Ile Asn Thr Val Ala Glu His Leu Asp Met Leu Met Thr Cys
305             310             315             320
His His Leu Asp Lys Arg Ile Arg Glu Asp Leu Gln Phe Ser Gln Ser
            325             330             335
Arg Ile Arg Pro Gly Ser Ile Ala Ala Glu Asp Val Leu His Asp Ile
            340             345             350
Gly Val Ile Ala Met Thr Ser Ser Asp Ser Gln Ala Met Gly Arg Ala
        355             360             365
Gly Glu Val Ile Pro Arg Thr Trp Gln Thr Ala Asp Lys Asn Lys Lys
    370             375             380
Glu Phe Gly Lys Leu Pro Glu Asp Gly Ala Asp Asn Asp Asn Phe Arg
385             390             395             400
Ile Lys Arg Tyr Ile Ser Lys Tyr Thr Ile Asn Pro Ala Leu Thr His
            405             410             415
Gly Val Ser Glu Tyr Ile Gly Ser Val Glu Glu Gly Lys Ile Ala Asp
            420             425             430
Leu Val Val Trp Asn Pro Ala Phe Phe Gly Val Lys Pro Lys Ile Val
    435             440             445
```

21

```
Ile Lys Gly Gly Met Val Val Phe Ser Glu Met Gly Asp Ser Asn Ala
    450                 455                 460
Ser Val Pro Thr Pro Gln Pro Val Tyr Tyr Arg Glu Met Phe Gly His
465                 470                 475                 480
His Gly Lys Ala Lys Phe Asp Thr Ser Ile Thr Phe Arg Val Ser Ser
                485                 490                 495


<210> 10
<211> 2407
<212> DNA
<213> Helicobacter felis

<220>
<221> CDS
<222> (2)..(682)

<220>
<221> CDS
<222> (693)..(2399)

<400> 10
c gtg aaa ctc aca ccc aaa gag caa gaa aag ttc ttg tta tat tat gcg   49
  Val Lys Leu Thr Pro Lys Glu Gln Glu Lys Phe Leu Leu Tyr Tyr Ala
    1               5                  10                  15

ggc gaa gtg gct aga aag cgc aaa gcg gag ggc tta aag ctc aac caa   97
Gly Glu Val Ala Arg Lys Arg Lys Ala Glu Gly Leu Lys Leu Asn Gln
                20                  25                  30

ccc gaa gcc att gcc tac att agt gcc cat att atg gac gag gcg cgc  145
Pro Glu Ala Ile Ala Tyr Ile Ser Ala His Ile Met Asp Glu Ala Arg
            35                  40                  45

cgt ggc aaa aag acc gtt gcg gaa ctt atg gaa gag tgt atg cac ttt  193
Arg Gly Lys Lys Thr Val Ala Glu Leu Met Glu Glu Cys Met His Phe
        50                  55                  60

ttg aaa aaa gac gag gtg atg ccc ggt gtg ggg aat atg gtc cct gat  241
Leu Lys Lys Asp Glu Val Met Pro Gly Val Gly Asn Met Val Pro Asp
    65                  70                  75                  80

tta ggc gtg gaa gct act ttt ccc gat ggc acc aaa ctc gta acc gtg  289
Leu Gly Val Glu Ala Thr Phe Pro Asp Gly Thr Lys Leu Val Thr Val
                85                  90                  95

aat tgg ccc atc gaa ccc gat gaa cac ttc aaa gcg ggc gaa gtc aaa  337
```

22

```
Asn Trp Pro Ile Glu Pro Asp Glu His Phe Lys Ala Gly Glu Val Lys
        100                 105                 110

ttt ggc tgt gat aaa gac att gaa ctc aac gca ggt aag gaa gtt acc    385
Phe Gly Cys Asp Lys Asp Ile Glu Leu Asn Ala Gly Lys Glu Val Thr
        115                 120                 125

gaa cta gaa gtt acc aac gaa gga cct aaa tcc ttg cat gtg ggt agc    433
Glu Leu Glu Val Thr Asn Glu Gly Pro Lys Ser Leu His Val Gly Ser
        130                 135                 140

cat ttc cac ttc ttt gaa gcc aac aag gca ttg aaa ttc gat cgg gaa    481
His Phe His Phe Phe Glu Ala Asn Lys Ala Leu Lys Phe Asp Arg Glu
145                 150                 155                 160

aaa gcc tat ggc aaa cgc cta gat att ccc tct ggc aac acg cta cgc    529
Lys Ala Tyr Gly Lys Arg Leu Asp Ile Pro Ser Gly Asn Thr Leu Arg
                    165                 170                 175

att ggg gca gga caa acc cgt aaa gtg cag tta atc cct ctt ggc ggc    577
Ile Gly Ala Gly Gln Thr Arg Lys Val Gln Leu Ile Pro Leu Gly Gly
                    180                 185                 190

agt aaa aaa gtg att ggc atg aac ggg ctt gtg aat aat att gca gat    625
Ser Lys Lys Val Ile Gly Met Asn Gly Leu Val Asn Asn Ile Ala Asp
        195                 200                 205

gaa cgc cat aaa cac aaa gcg tta gaa aaa gca aaa tct cac gga ttt    673
Glu Arg His Lys His Lys Ala Leu Glu Lys Ala Lys Ser His Gly Phe
        210                 215                 220

atc aaa taa ggagactccc atg aaa atg aaa aaa caa gag tat gta aat    722
Ile Lys                     Met Lys Met Lys Lys Gln Glu Tyr Val Asn
225                                 230                 235

acc tac gga cct acc aca ggc gac aaa gtg cgc tta gga gat acc gat    770
Thr Tyr Gly Pro Thr Thr Gly Asp Lys Val Arg Leu Gly Asp Thr Asp
        240                 245                 250

ctt tgg gca gaa gta gaa cat gac tat acc act tat ggc gaa gag ctc    818
Leu Trp Ala Glu Val Glu His Asp Tyr Thr Thr Tyr Gly Glu Glu Leu
        255                 260                 265

aaa ttt ggc gcg ggt aaa act atc cgt gag ggc atg ggt cag agc aat    866
Lys Phe Gly Ala Gly Lys Thr Ile Arg Glu Gly Met Gly Gln Ser Asn
270                 275                 280                 285

agt cca gat gaa aac acc cta gat tta gtc atc acc aac gcg atg att    914
```

23

```
Ser Pro Asp Glu Asn Thr Leu Asp Leu Val Ile Thr Asn Ala Met Ile
             290                 295                 300

att gac tac acc ggg att tac aaa gcc gac att ggc att aaa aat ggc      962
Ile Asp Tyr Thr Gly Ile Tyr Lys Ala Asp Ile Gly Ile Lys Asn Gly
             305                 310                 315

aaa atc cat ggc att ggc aag gca gga aac aag gac atg caa gat ggc     1010
Lys Ile His Gly Ile Gly Lys Ala Gly Asn Lys Asp Met Gln Asp Gly
             320                 325                 330

gta agc cct cat atg gtc gtg ggt gtg ggc aca gaa gca tta gca ggg     1058
Val Ser Pro His Met Val Val Gly Val Gly Thr Glu Ala Leu Ala Gly
         335                 340                 345

gaa ggt atg att att acc gct ggg ggg atc gat tca cac acc cac ttc     1106
Glu Gly Met Ile Ile Thr Ala Gly Gly Ile Asp Ser His Thr His Phe
350                 355                 360                 365

ctc tct cca caa caa ttc cct acc gct cta gcc aat ggc gtt aca acc     1154
Leu Ser Pro Gln Gln Phe Pro Thr Ala Leu Ala Asn Gly Val Thr Thr
                 370                 375                 380

atg ttt ggc ggt ggc aca ggt ccg gta gat ggc acg aat gcg act acc     1202
Met Phe Gly Gly Gly Thr Gly Pro Val Asp Gly Thr Asn Ala Thr Thr
             385                 390                 395

atc act ccg ggc aaa tgg aac ttg cac cgc atg ttg cgc gca gct gaa     1250
Ile Thr Pro Gly Lys Trp Asn Leu His Arg Met Leu Arg Ala Ala Glu
             400                 405                 410

gag tat tct atg aat gtg ggc ttt ttg ggc aaa ggc aat agc tcc agt     1298
Glu Tyr Ser Met Asn Val Gly Phe Leu Gly Lys Gly Asn Ser Ser Ser
         415                 420                 425

aaa aaa caa ctt gta gaa caa ata gaa gcg ggc gcg atc ggc ttt aaa     1346
Lys Lys Gln Leu Val Glu Gln Ile Glu Ala Gly Ala Ile Gly Phe Lys
430                 435                 440                 445

ttg cat gaa gac tgg ggc aca act cca agt gca atc gat cac tgc ttg     1394
Leu His Glu Asp Trp Gly Thr Thr Pro Ser Ala Ile Asp His Cys Leu
             450                 455                 460

agc gta gca gat gaa tac gat gtg caa gtt tgt atc cac acc gat acg     1442
Ser Val Ala Asp Glu Tyr Asp Val Gln Val Cys Ile His Thr Asp Thr
             465                 470                 475

gtc aat gag gca ggt tat gta gat gac acc ctg aat gcg atg aac ggg     1490
```

24

```
Val Asn Glu Ala Gly Tyr Val Asp Asp Thr Leu Asn Ala Met Asn Gly
        480                 485                 490


cgc gcc atc cat gcc tac cac att gag gga gcg ggc gga gga cac tca    1538
Arg Ala Ile His Ala Tyr His Ile Glu Gly Ala Gly Gly Gly His Ser
        495                 500                 505


cct gat gtt atc acc atg gca ggc gag ctc aat att cta ccc tcc tcc    1586
Pro Asp Val Ile Thr Met Ala Gly Glu Leu Asn Ile Leu Pro Ser Ser
510                 515                 520                 525


aca acc ccc act atc ccc tat acc att aat acg gtt gca gaa cac tta    1634
Thr Thr Pro Thr Ile Pro Tyr Thr Ile Asn Thr Val Ala Glu His Leu
                530                 535                 540


gac atg ctc atg acc tgc cac cac cta gat aaa cgc atc cgc gag gat    1682
Asp Met Leu Met Thr Cys His His Leu Asp Lys Arg Ile Arg Glu Asp
                545                 550                 555


tta caa ttt tcc caa agc cgt atc cgc ccc ggc tct atc gcc gct gaa    1730
Leu Gln Phe Ser Gln Ser Arg Ile Arg Pro Gly Ser Ile Ala Ala Glu
                560                 565                 570


gat gtg ctc cat gat att ggc gtg atc gcg atg aca agc tcg gat tcg    1778
Asp Val Leu His Asp Ile Gly Val Ile Ala Met Thr Ser Ser Asp Ser
        575                 580                 585


caa gca atg ggg cgc gct ggc gaa gtg att cct cga act tgg cag act    1826
Gln Ala Met Gly Arg Ala Gly Glu Val Ile Pro Arg Thr Trp Gln Thr
590                 595                 600                 605


gcg gat aag aat aaa aaa gaa ttt ggt aag ctt cct gaa gat agt gca    1874
Ala Asp Lys Asn Lys Lys Glu Phe Gly Lys Leu Pro Glu Asp Ser Ala
                610                 615                 620


gat aac gac aac ttc cgt atc aaa cgc tac atc tcc aaa tac act att    1922
Asp Asn Asp Asn Phe Arg Ile Lys Arg Tyr Ile Ser Lys Tyr Thr Ile
                625                 630                 635


aac ccc gct cta acc cat ggg gta agc gag tat atc ggc tct gtg gaa    1970
Asn Pro Ala Leu Thr His Gly Val Ser Glu Tyr Ile Gly Ser Val Glu
                640                 645                 650


gag ggc aaa atc gct gat ttg gtg gtg tgg aat cct gcc ttt ttt ggt    2018
Glu Gly Lys Ile Ala Asp Leu Val Val Trp Asn Pro Ala Phe Phe Gly
        655                 660                 665


gtg aaa cct aag att gtg atc aaa ggc ggt atg gtg gtc ttc tct gaa    2066
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25

Val Lys Pro Lys Ile Val Ile Lys Gly Gly Met Val Val Phe Ser Glu
670   675   680   685

atg ggc gac tcc aac gcg tcc gtg cct aca cct cag ccg gtt tat tac   2114
Met Gly Asp Ser Asn Ala Ser Val Pro Thr Pro Gln Pro Val Tyr Tyr
                690   695   700

cgc gaa atg ttt ggg cat cac ggc aag gcg aaa ttt gac acc agc atc   2162
Arg Glu Met Phe Gly His His Gly Lys Ala Lys Phe Asp Thr Ser Ile
            705   710   715

act ttt gtt tcc aaa gtc gcc tat gaa aat ggc gtg aaa gaa aaa cta   2210
Thr Phe Val Ser Lys Val Ala Tyr Glu Asn Gly Val Lys Glu Lys Leu
        720   725   730

ggc tta gag cgc aag gtg cta ccc gtg aaa aac tgc cgc aac atc act   2258
Gly Leu Glu Arg Lys Val Leu Pro Val Lys Asn Cys Arg Asn Ile Thr
        735   740   745

aag aaa gac ttc aaa ttc aac aac aag acg gcg cat atc act gtc gat   2306
Lys Lys Asp Phe Lys Phe Asn Asn Lys Thr Ala His Ile Thr Val Asp
750   755   760   765

cct aaa acc ttc gag gtc ttt gta gat ggc aaa ctc tgc acc tct aaa   2354
Pro Lys Thr Phe Glu Val Phe Val Asp Gly Lys Leu Cys Thr Ser Lys
            770   775   780

ccc gcc tct gaa gtg cct cta gcc cag cgc tac act ttc ttc tag   2399
Pro Ala Ser Glu Val Pro Leu Ala Gln Arg Tyr Thr Phe Phe
            785   790   795

gcncaatg   2407

<210> 11
<211> 226
<212> PRT
<213> Helicobacter felis

<400> 11
Val Lys Leu Thr Pro Lys Glu Gln Glu Lys Phe Leu Leu Tyr Tyr Ala
 1   5   10   15
Gly Glu Val Ala Arg Lys Arg Lys Ala Glu Gly Leu Lys Leu Asn Gln
            20   25   30
Pro Glu Ala Ile Ala Tyr Ile Ser Ala His Ile Met Asp Glu Ala Arg
        35   40   45
Arg Gly Lys Lys Thr Val Ala Glu Leu Met Glu Glu Cys Met His Phe
    50   55   60

26

Leu Lys Lys Asp Glu Val Met Pro Gly Val Gly Asn Met Val Pro Asp
 65   70   75   80
Leu Gly Val Glu Ala Thr Phe Pro Asp Gly Thr Lys Leu Val Thr Val
             85   90   95
Asn Trp Pro Ile Glu Pro Asp Glu His Phe Lys Ala Gly Glu Val Lys
            100   105   110
Phe Gly Cys Asp Lys Asp Ile Glu Leu Asn Ala Gly Lys Glu Val Thr
            115   120   125
Glu Leu Glu Val Thr Asn Glu Gly Pro Lys Ser Leu His Val Gly Ser
    130   135   140
His Phe His Phe Phe Glu Ala Asn Lys Ala Leu Lys Phe Asp Arg Glu
145   150   155   160
Lys Ala Tyr Gly Lys Arg Leu Asp Ile Pro Ser Gly Asn Thr Leu Arg
            165   170   175
Ile Gly Ala Gly Gln Thr Arg Lys Val Gln Leu Ile Pro Leu Gly Gly
            180   185   190
Ser Lys Lys Val Ile Gly Met Asn Gly Leu Val Asn Asn Ile Ala Asp
    195   200   205
Glu Arg His Lys His Lys Ala Leu Glu Lys Ala Lys Ser His Gly Phe
    210   215   220
Ile Lys
225

<210> 12
<211> 568
<212> PRT
<213> Helicobacter felis

<400> 12
Met Lys Met Lys Lys Gln Glu Tyr Val Asn Thr Tyr Gly Pro Thr Thr
 1   5   10   15
Gly Asp Lys Val Arg Leu Gly Asp Thr Asp Leu Trp Ala Glu Val Glu
             20   25   30
His Asp Tyr Thr Thr Tyr Gly Glu Glu Leu Lys Phe Gly Ala Gly Lys
             35   40   45
Thr Ile Arg Glu Gly Met Gly Gln Ser Asn Ser Pro Asp Glu Asn Thr
     50   55   60
Leu Asp Leu Val Ile Thr Asn Ala Met Ile Ile Asp Tyr Thr Gly Ile
 65   70   75   80
Tyr Lys Ala Asp Ile Gly Ile Lys Asn Gly Lys Ile His Gly Ile Gly
             85   90   95
Lys Ala Gly Asn Lys Asp Met Gln Asp Gly Val Ser Pro His Met Val
            100   105   110
Val Gly Val Gly Thr Glu Ala Leu Ala Gly Glu Gly Met Ile Ile Thr
            115   120   125
Ala Gly Gly Ile Asp Ser His Thr His Phe Leu Ser Pro Gln Gln Phe
    130   135   140

27

```
Pro Thr Ala Leu Ala Asn Gly Val Thr Thr Met Phe Gly Gly Gly Thr
145                 150                 155                 160
Gly Pro Val Asp Gly Thr Asn Ala Thr Thr Ile Thr Pro Gly Lys Trp
                165                 170                 175
Asn Leu His Arg Met Leu Arg Ala Ala Glu Glu Tyr Ser Met Asn Val
            180                 185                 190
Gly Phe Leu Gly Lys Gly Asn Ser Ser Ser Lys Lys Gln Leu Val Glu
            195                 200                 205
Gln Ile Glu Ala Gly Ala Ile Gly Phe Lys Leu His Glu Asp Trp Gly
    210                 215                 220
Thr Thr Pro Ser Ala Ile Asp His Cys Leu Ser Val Ala Asp Glu Tyr
225                 230                 235                 240
Asp Val Gln Val Cys Ile His Thr Asp Thr Val Asn Glu Ala Gly Tyr
                245                 250                 255
Val Asp Asp Thr Leu Asn Ala Met Asn Gly Arg Ala Ile His Ala Tyr
            260                 265                 270
His Ile Glu Gly Ala Gly Gly Gly His Ser Pro Asp Val Ile Thr Met
            275                 280                 285
Ala Gly Glu Leu Asn Ile Leu Pro Ser Ser Thr Thr Pro Thr Ile Pro
    290                 295                 300
Tyr Thr Ile Asn Thr Val Ala Glu His Leu Asp Met Leu Met Thr Cys
305                 310                 315                 320
His His Leu Asp Lys Arg Ile Arg Glu Asp Leu Gln Phe Ser Gln Ser
            325                 330                 335
Arg Ile Arg Pro Gly Ser Ile Ala Ala Glu Asp Val Leu His Asp Ile
            340                 345                 350
Gly Val Ile Ala Met Thr Ser Ser Asp Ser Gln Ala Met Gly Arg Ala
            355                 360                 365
Gly Glu Val Ile Pro Arg Thr Trp Gln Thr Ala Asp Lys Asn Lys Lys
    370                 375                 380
Glu Phe Gly Lys Leu Pro Glu Asp Ser Ala Asp Asn Asp Asn Phe Arg
385                 390                 395                 400
Ile Lys Arg Tyr Ile Ser Lys Tyr Thr Ile Asn Pro Ala Leu Thr His
            405                 410                 415
Gly Val Ser Glu Tyr Ile Gly Ser Val Glu Glu Gly Lys Ile Ala Asp
            420                 425                 430
Leu Val Val Trp Asn Pro Ala Phe Phe Gly Val Lys Pro Lys Ile Val
            435                 440                 445
Ile Lys Gly Gly Met Val Val Phe Ser Glu Met Gly Asp Ser Asn Ala
    450                 455                 460
Ser Val Pro Thr Pro Gln Pro Val Tyr Tyr Arg Glu Met Phe Gly His
465                 470                 475                 480
His Gly Lys Ala Lys Phe Asp Thr Ser Ile Thr Phe Val Ser Lys Val
            485                 490                 495
Ala Tyr Glu Asn Gly Val Lys Glu Lys Leu Gly Leu Glu Arg Lys Val
            500                 505                 510
Leu Pro Val Lys Asn Cys Arg Asn Ile Thr Lys Lys Asp Phe Lys Phe
            515                 520                 525

                            28
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Asn Asn Lys Thr Ala His Ile Thr Val Asp Pro Lys Thr Phe Glu Val
    530                 535                 540
Phe Val Asp Gly Lys Leu Cys Thr Ser Lys Pro Ala Ser Glu Val Pro
545                 550                 555                 560
Leu Ala Gln Arg Tyr Thr Phe Phe
                565


<210> 13
<211> 2452
<212> DNA
<213> Helicobacter felis

<220>
<221> CDS
<222> (48)..(728)

<220>
<221> CDS
<222> (739)..(2445)

<400> 13
aggactataa tcccattgcc tttaaaattt aacacaagga gtaatag gtg aaa ctc    56
                                                    Val Lys Leu
                                                      1


aca ccc aaa gag caa gaa aag ttc ttg tta tat tat gcg ggc gaa gtg   104
Thr Pro Lys Glu Gln Glu Lys Phe Leu Leu Tyr Tyr Ala Gly Glu Val
      5                  10                  15


gct aga aag cgc aaa gca gag ggc tta aag ctc aac caa ccc gaa gcc   152
Ala Arg Lys Arg Lys Ala Glu Gly Leu Lys Leu Asn Gln Pro Glu Ala
 20                  25                  30                  35


att gcc tac att agt gcc cat att atg gac gag gcg cgt cgt ggc aaa   200
Ile Ala Tyr Ile Ser Ala His Ile Met Asp Glu Ala Arg Arg Gly Lys
                40                  45                  50


aaa acc gtt gcg gaa ctt atg gaa gag tgt atg cac ttt ttg aaa aaa   248
Lys Thr Val Ala Glu Leu Met Glu Glu Cys Met His Phe Leu Lys Lys
                55                  60                  65


gac gag gtg atg ccc ggg gtg ggg aat atg gtc cct gat ttg ggc gtg   296
Asp Glu Val Met Pro Gly Val Gly Asn Met Val Pro Asp Leu Gly Val
                70                  75                  80


gaa gcc act ttc ccc gat ggc acc aaa ctc gta act gtg aat tgg ccc   344


29
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```
Glu Ala Thr Phe Pro Asp Gly Thr Lys Leu Val Thr Val Asn Trp Pro
    85                  90                  95


atc gaa cct gat gaa cac ttt aag gcg ggt gaa gtg aaa ttt ggc tgt     392
Ile Glu Pro Asp Glu His Phe Lys Ala Gly Glu Val Lys Phe Gly Cys
100                 105                 110                 115


gat aaa gac att gaa ctc aac gca ggt aag gaa gtt acc gaa cta gaa     440
Asp Lys Asp Ile Glu Leu Asn Ala Gly Lys Glu Val Thr Glu Leu Glu
                120                 125                 130


gtt act aac gaa gga cct aaa tcc ttg cat gtg ggt agc cat ttc cac     488
Val Thr Asn Glu Gly Pro Lys Ser Leu His Val Gly Ser His Phe His
                135                 140                 145


ttc ttt gaa gcc aac aaa gca ttg aaa ttc gat cgg gaa aaa gcc tat     536
Phe Phe Glu Ala Asn Lys Ala Leu Lys Phe Asp Arg Glu Lys Ala Tyr
            150                 155                 160


ggc aaa cgc cta gat att ccc tct ggc aac aca cta cgc att ggg gca     584
Gly Lys Arg Leu Asp Ile Pro Ser Gly Asn Thr Leu Arg Ile Gly Ala
        165                 170                 175


gga caa acc cgt aaa gtg cag tta atc cct ctt ggc ggt agt aaa aaa     632
Gly Gln Thr Arg Lys Val Gln Leu Ile Pro Leu Gly Gly Ser Lys Lys
180                 185                 190                 195


gtg att ggc atg aac ggg ctt gtg aat aat att gcg gac gaa cgc cat     680
Val Ile Gly Met Asn Gly Leu Val Asn Asn Ile Ala Asp Glu Arg His
                200                 205                 210


aaa cac aaa gcg cta gac aaa gca aaa tct cac gga ttt atc aag taa     728
Lys His Lys Ala Leu Asp Lys Ala Lys Ser His Gly Phe Ile Lys
            215                 220                 225


ggagactccc atg aaa atg aaa aaa caa gag tat gta aat acc tac gga      777
           Met Lys Met Lys Lys Gln Glu Tyr Val Asn Thr Tyr Gly
               230                 235                 240


ccc acc aca ggc gat aaa gtg cgc tta gga gat acc gat ctt tgg gca     825
Pro Thr Thr Gly Asp Lys Val Arg Leu Gly Asp Thr Asp Leu Trp Ala
            245                 250                 255


gaa gta gaa cat gac tat acc acc tat ggc gaa gaa ctc aaa ttc ggt     873
Glu Val Glu His Asp Tyr Thr Thr Tyr Gly Glu Glu Leu Lys Phe Gly
            260                 265                 270


gca ggt aaa act atc cgt gag ggt atg ggt cag agc aat agc cca gat     921
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30

Ala Gly Lys Thr Ile Arg Glu Gly Met Gly Gln Ser Asn Ser Pro Asp
        275   280   285

gaa aac acc tta gat tta gtg atc acc aac gcg atg att att gac tac   969
Glu Asn Thr Leu Asp Leu Val Ile Thr Asn Ala Met Ile Ile Asp Tyr
        290   295   300

acc ggg att tac aaa gcc gac att ggc att aaa aat ggc aaa atc cat   1017
Thr Gly Ile Tyr Lys Ala Asp Ile Gly Ile Lys Asn Gly Lys Ile His
305   310   315   320

ggc att ggc aag gca gga aac aag gac atg caa gat ggc gta agc cct   1065
Gly Ile Gly Lys Ala Gly Asn Lys Asp Met Gln Asp Gly Val Ser Pro
                325   330   335

cat atg gtc gtg ggt gtg ggc aca gaa gca cta gca ggg gaa ggt atg   1113
His Met Val Val Gly Val Gly Thr Glu Ala Leu Ala Gly Glu Gly Met
            340   345   350

att att acc gct ggg ggg atc gat tca cac acc cac ttc ctc tct cca   1161
Ile Ile Thr Ala Gly Gly Ile Asp Ser His Thr His Phe Leu Ser Pro
            355   360   365

caa caa ttc cct acc gct cta gcc aat ggc gtt aca aca atg ttt ggc   1209
Gln Gln Phe Pro Thr Ala Leu Ala Asn Gly Val Thr Thr Met Phe Gly
        370   375   380

ggt ggc aca ggc ccc gta gat ggc acg aat gcg act acc atc act ccg   1257
Gly Gly Thr Gly Pro Val Asp Gly Thr Asn Ala Thr Thr Ile Thr Pro
385   390   395   400

ggc aaa tgg aac ttg cac cgc atg ttg cgc gca gca gaa gag tat tct   1305
Gly Lys Trp Asn Leu His Arg Met Leu Arg Ala Ala Glu Glu Tyr Ser
                405   410   415

atg aat gtg ggc ttt ttg ggc aaa ggc aat agc tct agt aaa aaa caa   1353
Met Asn Val Gly Phe Leu Gly Lys Gly Asn Ser Ser Ser Lys Lys Gln
                420   425   430

ctt gta gaa caa gta gaa gcg ggc gcg att ggt ttt aaa ttg cat gaa   1401
Leu Val Glu Gln Val Glu Ala Gly Ala Ile Gly Phe Lys Leu His Glu
            435   440   445

gac tgg ggc aca act cca agt gcg atc gat cac tgc ttg agc gta gca   1449
Asp Trp Gly Thr Thr Pro Ser Ala Ile Asp His Cys Leu Ser Val Ala
        450   455   460

gat gaa tac gat gtg caa gtt tgt ata cac acc gat acg tac aat gag   1497

31

```
Asp Glu Tyr Asp Val Gln Val Cys Ile His Thr Asp Thr Val Asn Glu
465             470             475             480

gca ggt tat gta gat gac acc cta aat gca atg aac ggg cgc gcc atc   1545
Ala Gly Tyr Val Asp Asp Thr Leu Asn Ala Met Asn Gly Arg Ala Ile
                485             490             495

cat gcc tac cac att gag gga gcg ggt gga gga cac tca cct gat gtt   1593
His Ala Tyr His Ile Glu Gly Ala Gly Gly Gly His Ser Pro Asp Val
                500             505             510

atc acc atg gca ggc gaa gtg aat att cta ccc tcc tcc aca acc cct   1641
Ile Thr Met Ala Gly Glu Val Asn Ile Leu Pro Ser Ser Thr Thr Pro
                515             520             525

act atc ccc tat acc att aat acg gtt gca gaa cac tta gac atg ctt   1689
Thr Ile Pro Tyr Thr Ile Asn Thr Val Ala Glu His Leu Asp Met Leu
            530             535             540

atg acc tgc cac cac cta gat aaa cgc atc cgc gag gat ctc caa ttt   1737
Met Thr Cys His His Leu Asp Lys Arg Ile Arg Glu Asp Leu Gln Phe
545             550             555             560

tct caa agc cgt atc cgc ccc ggc tct atc gcc gct gaa gat gtg ctc   1785
Ser Gln Ser Arg Ile Arg Pro Gly Ser Ile Ala Ala Glu Asp Val Leu
                565             570             575

cat gat atc ggt gtg atc gcg atg aca agt tcc gat tcg caa gca atg   1833
His Asp Ile Gly Val Ile Ala Met Thr Ser Ser Asp Ser Gln Ala Met
                580             585             590

ggg cgc gct ggg gaa gtg att cct aga act tgg caa act gca gac aag   1881
Gly Arg Ala Gly Glu Val Ile Pro Arg Thr Trp Gln Thr Ala Asp Lys
                595             600             605

aat aaa aaa gaa ttt ggt aag ctt cct gaa gat ggt gca gat aat gac   1929
Asn Lys Lys Glu Phe Gly Lys Leu Pro Glu Asp Gly Ala Asp Asn Asp
                610             615             620

aac ttc cgc atc aaa cgc tat atc tcc aaa tac acc att aat ccc gct   1977
Asn Phe Arg Ile Lys Arg Tyr Ile Ser Lys Tyr Thr Ile Asn Pro Ala
625             630             635             640

ttg acc cat ggc gtg agc gag tat atc ggc tct gtg gaa gag ggc aag   2025
Leu Thr His Gly Val Ser Glu Tyr Ile Gly Ser Val Glu Glu Gly Lys
                645             650             655

atc gcc gac ttg gtg gtg tgg aat cct gcc ttt ttt ggc gta aaa ccc   2073
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Ile Ala Asp Leu Val Val Trp Asn Pro Ala Phe Phe Gly Val Lys Pro
              660                 665                 670


aaa atc gtg atc aaa ggc ggt atg gtg gtg ttc tct gaa atg ggc gat    2121
Lys Ile Val Ile Lys Gly Gly Met Val Val Phe Ser Glu Met Gly Asp
              675                 680                 685


tct aat gcg tct gtg ccc act cct cag ccg gtt tat tac cgc gaa atg    2169
Ser Asn Ala Ser Val Pro Thr Pro Gln Pro Val Tyr Tyr Arg Glu Met
              690                 695                 700


ttt ggg cat cac ggc aag gcg aaa ttt gac acc agc atc act ttt gtt    2217
Phe Gly His His Gly Lys Ala Lys Phe Asp Thr Ser Ile Thr Phe Val
705                 710                 715                 720


tcc aaa gtc gcc tat gaa aat ggt gtg aaa gaa aaa cta ggt tta gag    2265
Ser Lys Val Ala Tyr Glu Asn Gly Val Lys Glu Lys Leu Gly Leu Glu
                  725                 730                 735


cgc aag gtg ctc ccc gtg aaa aac tgc cgt aac atc acc aag aag gac    2313
Arg Lys Val Leu Pro Val Lys Asn Cys Arg Asn Ile Thr Lys Lys Asp
                  740                 745                 750


ttc aag ttc aac gac aaa act gca aaa atc acc gtc gat ccg aaa acc    2361
Phe Lys Phe Asn Asp Lys Thr Ala Lys Ile Thr Val Asp Pro Lys Thr
                  755                 760                 765


ttc gag gtc ttt gta gat ggc aaa ctc tgc acc tct aaa ccc acc tct    2409
Phe Glu Val Phe Val Asp Gly Lys Leu Cys Thr Ser Lys Pro Thr Ser
                  770                 775                 780


gaa gtg cct cta gcc caa cgc tac act ttc ttc tag gcataat           2452
Glu Val Pro Leu Ala Gln Arg Tyr Thr Phe Phe
785                 790                 795



<210> 14
<211> 226
<212> PRT
<213> Helicobacter felis

<400> 14
Val Lys Leu Thr Pro Lys Glu Gln Glu Lys Phe Leu Leu Tyr Tyr Ala
  1             5                  10                  15
Gly Glu Val Ala Arg Lys Arg Lys Ala Glu Gly Leu Lys Leu Asn Gln
             20                  25                  30
Pro Glu Ala Ile Ala Tyr Ile Ser Ala His Ile Met Asp Glu Ala Arg
             35                  40                  45
```

33

Arg Gly Lys Lys Thr Val Ala Glu Leu Met Glu Glu Cys Met His Phe
    50   55   60

Leu Lys Lys Asp Glu Val Met Pro Gly Val Gly Asn Met Val Pro Asp
65   70   75   80

Leu Gly Val Glu Ala Thr Phe Pro Asp Gly Thr Lys Leu Val Thr Val
                85   90   95

Asn Trp Pro Ile Glu Pro Asp Glu His Phe Lys Ala Gly Glu Val Lys
                100   105   110

Phe Gly Cys Asp Lys Asp Ile Glu Leu Asn Ala Gly Lys Glu Val Thr
                115   120   125

Glu Leu Glu Val Thr Asn Glu Gly Pro Lys Ser Leu His Val Gly Ser
    130   135   140

His Phe His Phe Phe Glu Ala Asn Lys Ala Leu Lys Phe Asp Arg Glu
145   150   155   160

Lys Ala Tyr Gly Lys Arg Leu Asp Ile Pro Ser Gly Asn Thr Leu Arg
                165   170   175

Ile Gly Ala Gly Gln Thr Arg Lys Val Gln Leu Ile Pro Leu Gly Gly
                180   185   190

Ser Lys Lys Val Ile Gly Met Asn Gly Leu Val Asn Asn Ile Ala Asp
                195   200   205

Glu Arg His Lys His Lys Ala Leu Asp Lys Ala Lys Ser His Gly Phe
    210   215   220

Ile Lys
225

<210> 15
<211> 568
<212> PRT
<213> Helicobacter felis

<400> 15
Met Lys Met Lys Lys Gln Glu Tyr Val Asn Thr Tyr Gly Pro Thr Thr
    1   5   10   15

Gly Asp Lys Val Arg Leu Gly Asp Thr Asp Leu Trp Ala Glu Val Glu
                20   25   30

His Asp Tyr Thr Thr Tyr Gly Glu Glu Leu Lys Phe Gly Ala Gly Lys
        35   40   45

Thr Ile Arg Glu Gly Met Gly Gln Ser Asn Ser Pro Asp Glu Asn Thr
    50   55   60

Leu Asp Leu Val Ile Thr Asn Ala Met Ile Ile Asp Tyr Thr Gly Ile
65   70   75   80

Tyr Lys Ala Asp Ile Gly Ile Lys Asn Gly Lys Ile His Gly Ile Gly
                85   90   95

Lys Ala Gly Asn Lys Asp Met Gln Asp Gly Val Ser Pro His Met Val
                100   105   110

Val Gly Val Gly Thr Glu Ala Leu Ala Gly Glu Gly Met Ile Ile Thr
        115   120   125

34

Ala Gly Gly Ile Asp Ser His Thr His Phe Leu Ser Pro Gln Gln Phe
    130   135   140
Pro Thr Ala Leu Ala Asn Gly Val Thr Thr Met Phe Gly Gly Gly Thr
145   150   155   160
Gly Pro Val Asp Gly Thr Asn Ala Thr Thr Ile Thr Pro Gly Lys Trp
                165   170   175
Asn Leu His Arg Met Leu Arg Ala Ala Glu Glu Tyr Ser Met Asn Val
                180   185   190
Gly Phe Leu Gly Lys Gly Asn Ser Ser Ser Lys Lys Gln Leu Val Glu
                195   200   205
Gln Val Glu Ala Gly Ala Ile Gly Phe Lys Leu His Glu Asp Trp Gly
    210   215   220
Thr Thr Pro Ser Ala Ile Asp His Cys Leu Ser Val Ala Asp Glu Tyr
225   230   235   240
Asp Val Gln Val Cys Ile His Thr Asp Thr Val Asn Glu Ala Gly Tyr
                245   250   255
Val Asp Asp Thr Leu Asn Ala Met Asn Gly Arg Ala Ile His Ala Tyr
                260   265   270
His Ile Glu Gly Ala Gly Gly Gly His Ser Pro Asp Val Ile Thr Met
    275   280   285
Ala Gly Glu Val Asn Ile Leu Pro Ser Ser Thr Thr Pro Thr Ile Pro
    290   295   300
Tyr Thr Ile Asn Thr Val Ala Glu His Leu Asp Met Leu Met Thr Cys
305   310   315   320
His His Leu Asp Lys Arg Ile Arg Glu Asp Leu Gln Phe Ser Gln Ser
                325   330   335
Arg Ile Arg Pro Gly Ser Ile Ala Ala Glu Asp Val Leu His Asp Ile
                340   345   350
Gly Val Ile Ala Met Thr Ser Ser Asp Ser Gln Ala Met Gly Arg Ala
    355   360   365
Gly Glu Val Ile Pro Arg Thr Trp Gln Thr Ala Asp Lys Asn Lys Lys
    370   375   380
Glu Phe Gly Lys Leu Pro Glu Asp Gly Ala Asp Asn Asp Asn Phe Arg
385   390   395   400
Ile Lys Arg Tyr Ile Ser Lys Tyr Thr Ile Asn Pro Ala Leu Thr His
                405   410   415
Gly Val Ser Glu Tyr Ile Gly Ser Val Glu Glu Gly Lys Ile Ala Asp
                420   425   430
Leu Val Val Trp Asn Pro Ala Phe Phe Gly Val Lys Pro Lys Ile Val
    435   440   445
Ile Lys Gly Gly Met Val Val Phe Ser Glu Met Gly Asp Ser Asn Ala
    450   455   460
Ser Val Pro Thr Pro Gln Pro Val Tyr Tyr Arg Glu Met Phe Gly His
465   470   475   480
His Gly Lys Ala Lys Phe Asp Thr Ser Ile Thr Phe Val Ser Lys Val
                485   490   495
Ala Tyr Glu Asn Gly Val Lys Glu Lys Leu Gly Leu Glu Arg Lys Val
    500   505   510

35

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Asn Asp Lys Thr Ala Lys Ile Thr Val Asp Pro Lys Thr Phe Glu Val
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